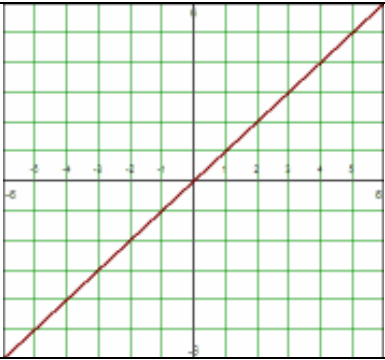
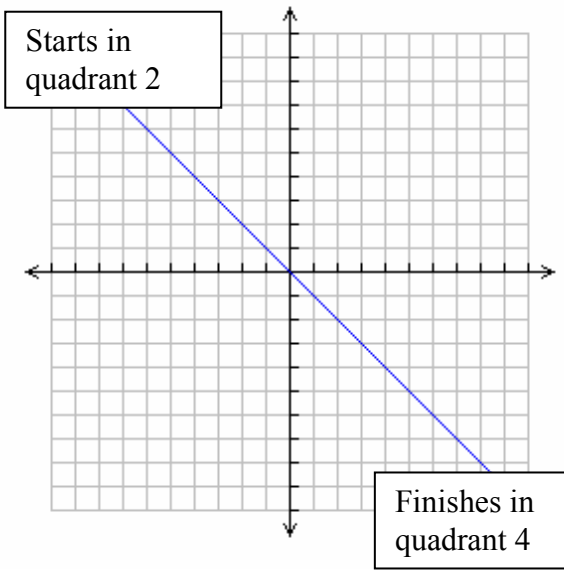
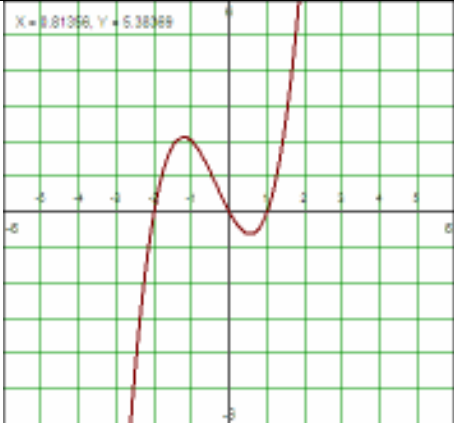
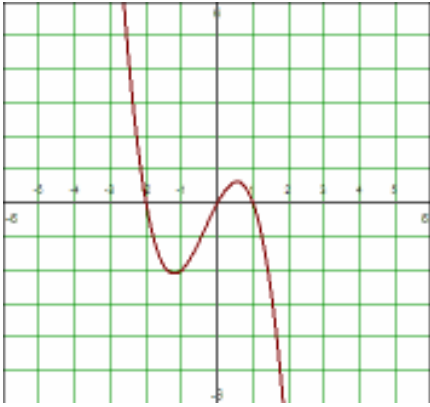
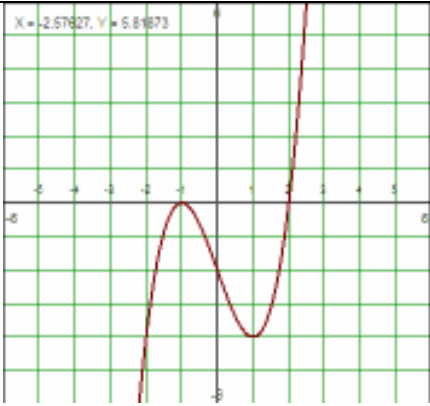
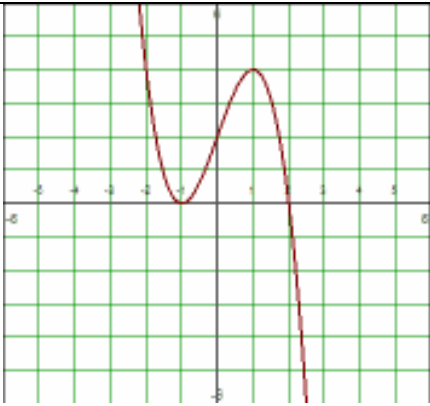


Time to investigate polynomial functions:

Part 1: Fill-in the chart below and look for any emerging patterns. Use GraphCalc to graph the functions. Function #2 has been completed for you. Use it as your model.:

Polynomial Function	Sketch of the function	Degree	Sign (positive or negative function)	Start and end Quadrants (left → right)
$y = x$		Odd degree of 1	Positive	3 to 1
$y = -x$		Odd (first degree polynomial)	Negative	2 → 4

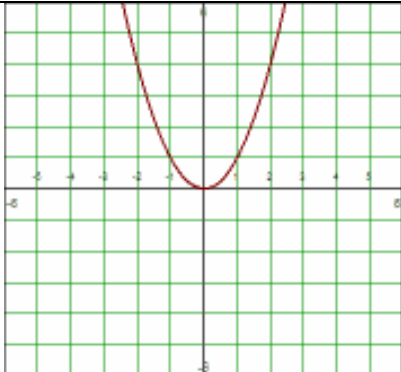
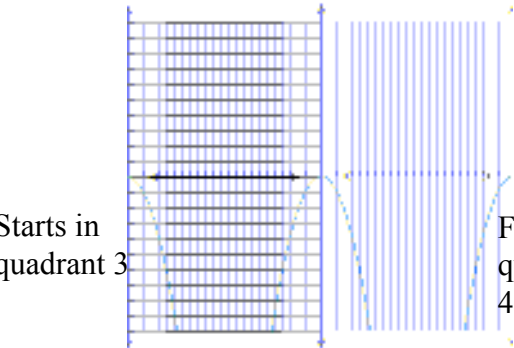
$y = x(x-1)(x+2)$		Odd – degree of 3	Positive	2 to 4
$y = -x(x-1)(x+2)$		Odd – degree of 3	Negative	2 to 4
$y = (x+1)^2(x-2)$		Odd – degree of 3	Positive	1 to 3
$y = -(x+1)^2(x-2)$		Odd – degree of 3	Negative	2 to 4

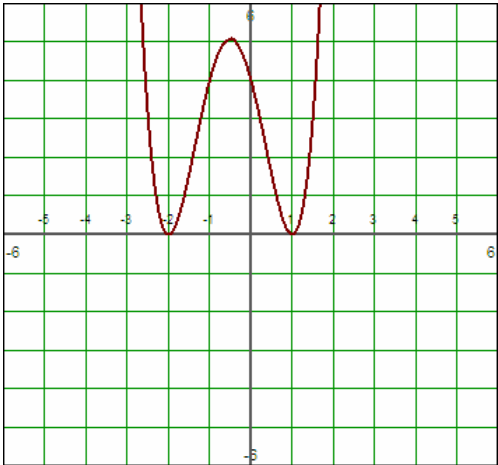
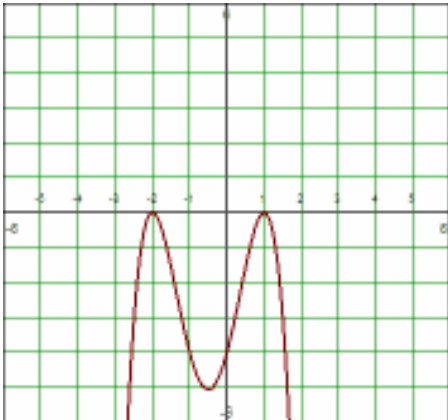
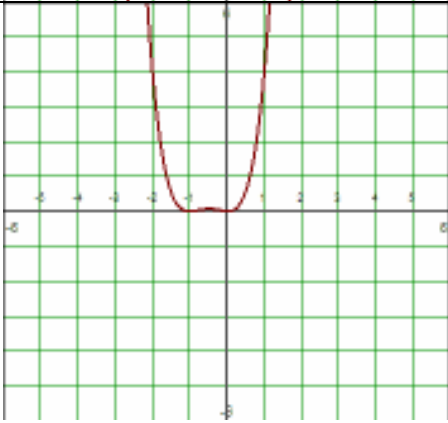
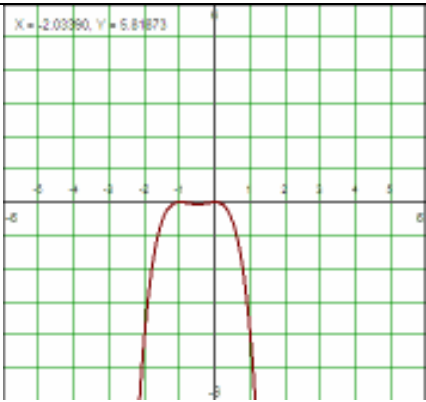
Complete the following sentences:

1. When a polynomial function is **odd** and **negative**, it starts in quadrant 2 and end in quadrant 4 moving left to right.
2. When a polynomial function is **odd** and **positive**, it starts in quadrant 1 and end in quadrant 3 moving left to right.

Time to investigate polynomial functions

Part 2: Fill-in the chart below and look for any emerging patterns. Use GraphCalc to graph the functions. Function #2 has been completed for you. Use it as your model.:

Polynomial Functions	Sketch of the function	Degree	Sign (positive or negative function)	Quadrants (left → right)
$y = x^2$		Even – degree of 2	Positive	2 to 1
$y = -x^2$	 Starts in quadrant 3 Finishes quadrant 4	Even (second degree polynomial)	Negative	3 → 4

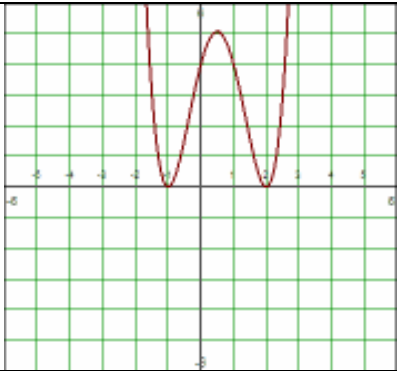
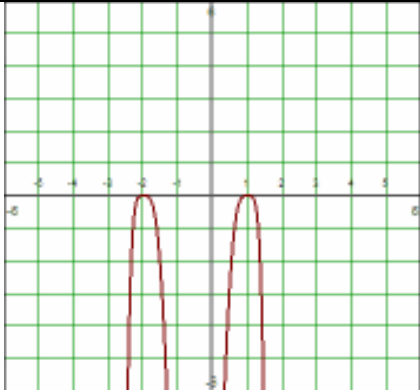

$y = (x-1)^2(x+2)^2$	 <p>A graph of the function $y = (x-1)^2(x+2)^2$ on a Cartesian coordinate system. The x-axis ranges from -6 to 6, and the y-axis ranges from -6 to 6. The curve is a red line that is always non-negative. It has x-intercepts at $x = -2$ and $x = 1$, both of which are double roots. The curve has a local minimum at $(-0.5, 0)$ and a local maximum at $(-0.5, 1.125)$. The curve is symmetric about the y-axis.</p>	Even – degree 4	Positive	2 to 1
$y = -(x-1)^2(x+2)^2$	 <p>A graph of the function $y = -(x-1)^2(x+2)^2$ on a Cartesian coordinate system. The x-axis ranges from -6 to 6, and the y-axis ranges from -6 to 6. The curve is a red line that is always non-positive. It has x-intercepts at $x = -2$ and $x = 1$, both of which are double roots. The curve has a local maximum at $(-0.5, 0)$ and a local minimum at $(-0.5, -1.125)$. The curve is symmetric about the y-axis.</p>	Even – degree 4	Negative	3 to 4
$y = x^2(x+1)^2$	 <p>A graph of the function $y = x^2(x+1)^2$ on a Cartesian coordinate system. The x-axis ranges from -6 to 6, and the y-axis ranges from -6 to 6. The curve is a red line that is always non-negative. It has x-intercepts at $x = 0$ and $x = -1$, both of which are double roots. The curve has a local minimum at $(-0.5, 0)$ and a local maximum at $(-0.5, 0.25)$. The curve is symmetric about the y-axis.</p>	Even – degree 4	Positive	2 to 1
$y = -x^2(x+1)^2$	 <p>A graph of the function $y = -x^2(x+1)^2$ on a Cartesian coordinate system. The x-axis ranges from -6 to 6, and the y-axis ranges from -6 to 6. The curve is a red line that is always non-positive. It has x-intercepts at $x = 0$ and $x = -1$, both of which are double roots. The curve has a local maximum at $(-0.5, 0)$ and a local minimum at $(-0.5, -0.25)$. The curve is symmetric about the y-axis. A data point is labeled at the top left: $X = -2.03390, Y = 5.81873$.</p>	Even – degree 4	Negative	3 to 4


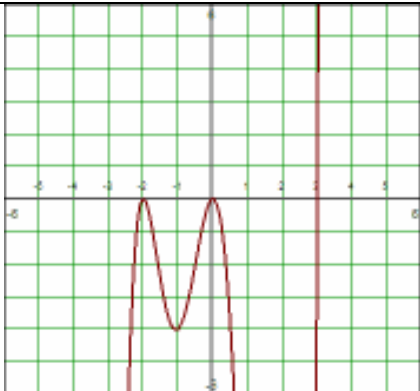

Complete the following sentences:

1. When a polynomial function is **even** and **negative**, it starts in quadrant __3__ and end in quadrant ____4__ moving left to right.
2. When a polynomial function is **even** and **positive**, it starts in quadrant __2__ and end in quadrant ____1__ moving left to right.

Time to investigate polynomial functions:

Part 3: Fill-in the chart below and look for any emerging patterns. Use GraphCalc to graph the functions.

Polynomial Functions	Sketch of the function	Degree	Sign (positive or negative function)	Quadrants (left → right)
$y = (x + 1)^2(x - 2)^4$		Even – degree 4	Positive	2 to 1
$y = -(x - 3)^4(x + 2)^4$		Even – degree 8	Negative	3 to 4
$y = (x - 1)(x + 2)^3$		Even – degree 4	Positive	2 to 1

$y = -(x-1)^3(x+2)$			Even	Negative	3 to 4
$y = x^2(x+2)^2(x-3)$			Odd – degree 5	Positive	3 to 1
$y = -(x+2)^5(x-3)^2$			Odd – degree 7	Negative	2 to 4

Complete the following sentences:

1. When a polynomial function has a repeated **even** root, the graph of the function ____bounces____ at that root.
2. When a polynomial function has a repeated **odd** root greater than 1, the graph of the function ____bends____ at that root.